REMARKS

Rejection of Claims 1-20

In Section 8 of the Final Office Action, claims 1-20 were again rejected under 35 U.S.C. §103(a) as being unpatentable over Carney et al., U.S. Pat. No. 5,937,011 (hereinafter referred to as Carney) in view of Kafadar et al., U.S. Pat. No. 5,321,726 (hereinafter referred to as Kafadar). The rejection of these claims is respectfully traversed for the reasons provided below. Arguments which support the patentability of the pending claims are first provided with reference to independent claim 1. These arguments are then incorporated in defense of the remaining independent and dependent claims.

1. Independent Claim 1

Claim 1 recites a quadrature modulator compensation system for compensating the transmission of a source signal provided by a signal source data generator. The quadrature modulator comprises a transmitter which translates a baseband transmitter input signal to a local oscillator frequency to generate a transmitter output signal. The recited quadrature modulator compensation system also comprises "calibration circuitry coupled to the transmitter and generating a phase error estimate of the transmitter as a function of an angle of intersection between a desired transmitter envelope and an actual transmitter envelope." Finally, as recited in claim 1, the quadrature modulator comprises "predistortion circuitry coupled to the signal source, the transmitter and the calibration circuitry, the predistortion circuitry receiving the source signal and the phase error estimate of the transmitter as inputs and providing as an output the transmitter input signal as a function of the phase error estimate of the transmitter".

2. Stated Basis of Rejection and Examiner's Responses to Applicant's Arguments

In support of the rejection of claim 1, in section 8 the Office Action stated that Carney discloses a predistortion detection technique comprising "[c]alibration circuitry . . .coupled to the transmitter which receives a correction signal from the predistortion processor and source signals

(121) to generate an error estimate of the transmitter." Next, the Office Action states that Carney's predistortion technique also comprises "[p]redistortion circuitry [that] receives the source signal (121) and uses the phase error estimate of the transmitter as an input and provides as an output the transmitter input signal as a function of the phase error estimate." However, in direct conflict with the assertion made in section 8 that Carney's predistortion technique uses a phase error estimate of the transmitter as an input, in section 2 the Final Office Action states: "The examiner admits that Carney fails to teach calibration circuitry generating a phase error estimate in any manner." Further, in section 3 the Final Office Action states: "The examiner admits that Carney is silent as to the use of phase error estimate in the transmitter."

Next, in section 8 the Final Office Action states that Carney does not disclose in the calibration circuitry the use of an ***angle of intersection*** between a desired transmitter envelope and an actual transmitter envelope in the generation of a phase error estimate, nor does it include a quadrature compensation system. Note the statements above in which it was admitted in the Office Action that Carney "fails to teach calibration circuitry generating a phase error estimate in any manner" and that "Carney is silent as to the use of phase error estimate in the transmitter." Again, in and effort to address this gap, the Final Office Action relies upon Kafadar, stating that this patent teaches a "Phase-Shift Keying (PSK) modulation system having a quadrature calibration of a vector demodulator using a statistical approach for analysis and correction of received data." The Office Action concludes that "[i]t would have been obvious . . . to incorporate Kafadar's quadrature modulator teachings into Carney's modulator correction system because PSK is an efficient modulation scheme for digital transmission." The rejection of claim 1 and the remaining claims is respectfully traversed for the reasons set forth below.

3. Claims 1-9 are Not Obvious in view of Carney and Kafadar

The mere fact that references ***can*** be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or

motivation in the reference to do so." 916 F.2d at 682, 16 USPQ2d at 1432.). The level of skill in the art cannot be relied upon to provide the suggestion to combine references. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999). "In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the reference before him to make the proposed substitution, combination, or other modification." *In re Linter*, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972).

To reach a proper determination under 35 U.S.C. § 103, the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. Knowledge of applicant's disclosure must be put aside in reaching this determination The tendency to resort to "hindsight" based upon applicant's disclosure is impermissible and must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art. See MPEP § 2142.

It is respectfully maintained that no teaching or suggestion has been identified which would properly support a combination of Carney and Kafadar. As admitted in the Final Office Action, Carney does not disclose a quadrature modulator compensation system. Likewise, Kafadar does not disclose a quadrature modulator compensation system either, but rather it discloses calibration of vector ***demodulators*** for receiving data transmitted by means of quadrature modulation format. The Final Office Action states in section 6 that "Kafadar discloses a calibration method in which both the angular difference, or phase estimate and the DC offsets are determined and input as calibration data to the transmitter." However, in direct conflict with this statement, in section 4 of the Final Office Action it is admitted that Kafadar does not disclose a quadrature modulator with the statement: "Kafadar does not discuss the use of these determined parameters in terms of predistortion circuitry for a transmitter." Notwithstanding the unsupported statement that it would be obvious to incorporate Kafadar's calibration teaching into Carney's modulator correction system "because PSK is an efficient modulation scheme for digital transmission", there is no teaching or suggestion to combine the vector ***demodulation*** calibration teachings of Kafadar, relating to ***receiving*** data in a quadrature modulation format,

with the ***transmitter or modulator*** predistortion teachings of Carney. This is even more evident given that fact that Carney has been admitted to not teach quadrature modulation.

Even if a combination of Carney and Kafadar were proper, the combination would still fail to teach every element of the invention recited in independent claim 1. Claim 1 recites "calibration circuitry coupled to the transmitter and generating a phase error estimate of the transmitter as a function of an angle of intersection between a desired transmitter envelope and an actual transmitter envelope." The Final Office Action references Kafadar (at col. 4) stating that the angular difference between the ideal quadrature and the actual quadrature can be thought of as the phase error estimate as a function of the angular difference between the desired signal envelope and the actual envelope. Assuming for the moment (without prejudice) that this statement accurately describes the teachings of Kafadar, it does not provide a teaching of this limitation of claim 1. The errors for which Kafadar wishes to compensate in the demodulator are a result, at least in part, of ***demodulator*** (i.e., receiver) component errors. See for example Kafadar at col. 3, lines 42-68. Kafadar does not support a conclusion that the angular difference is between the desired ***transmitter*** envelope and the actual ***transmitter*** envelope.

In addition to the fact that the phase error estimate defined in the Office Action is not the same as the phase error estimate required by the language of claim 1, there is no teaching or suggestion in either of Carney or Kafadar to predistort a signal source, ***as a function of the phase error estimate of the transmitter***, to provide a transmitter input signal. As admitted by the Examiner in the Final Office Action, while Carney does teach the generation of a predistortion signal, Carney does not teach providing a predistortion signal as a function of a phase error estimate. As was also admitted in the Final Office Action, Kafadar does not teach the use of the phase error estimate (and other parameters recited in dependent claims) in terms of predistortion circuitry for a transmitter, but rather in terms of calibration of a ***demodulator***. Therefore, since neither of the cited references teaches or suggests predistortion circuitry which receives the source signal ***and the phase error estimate of the transmitter*** as inputs, and provides as an output ***the transmitter input signal as a function of the phase error estimate of the transmitter***, this combination of references cannot render claim 1 obvious. Consequently, in view of the

above arguments, it is respectfully submitted that independent claim 1 and dependent claims 2-9 are in condition for allowance. It must be noted that, in addition to their dependence from claim 1, claims 2-9 also contain additional subject matter which renders these claims patentable. Reconsideration and withdraw of the rejections of claims 1-9 are therefore requested.

4. Claims 10-20 are Not Obvious in view of Carney and Kafadar

Independent claim 10 is directed to a method of compensating transmission of a source signal in a quadrature modulator. Among others, the method includes the step of "determining a phase error estimate of the transmitter as a function of an angle of intersection between the desired transmitter envelope and the actual transmitter envelope." The method also includes the step of predistorting the source signal to generate a transmitter input signal, "wherein the transmitter input signal is generated as a function of the source signal and the determined phase error estimate." In view of the arguments provided in support of independent claim 1, it is clear that these limitations of independent claim 10 are neither taught nor suggested by the cited combination or references. Since claims 11-14 depend from independent claim 10, these claims are patentable over the cited combination for these reasons in addition to the further limitations found in these claims.

Independent claim 15 is directed to a quadrature modulator compensation system for compensating the transmission of a source signal. As recited in claim 15, the system includes calibration circuitry coupled to a transmitter and "configured to generate at least one of a phase error estimate of the transmitter as a function of an angle of intersection between a desired transmitter envelope and an actual transmitter envelope, a gain error estimate of the transmitter as a function of variation in the actual transmitter envelope, and a dc offset estimate in an in-phase component and a quadrature component of the source signal as a function of a centroid of the actual transmitter envelope." Finally, claim 15 recites "predistortion circuitry receiving the source signal and at least one of the phase error estimate, the gain error estimate, and the dc offset estimate as inputs and providing as an output the transmitter input signal as a function of at least one of the phase error estimate, the gain error estimate, and the dc offset estimate."

Since both Carney and Kafadar are silent as to predistortion circuitry receiving at least one of a calibration circuitry generated phase error estimate, gain error estimate, or dc offset estimate as inputs and providing as an output the transmitter input signal as a function of the at least one of the calibration circuitry generated phase error estimate, the gain error estimate, and the dc offset estimate, it is submitted that the combination of steps recited in independent claim 15 are neither taught nor suggested by the cited references. Since claims 16-20 depend from independent claim 15, these claims are patentable over the cited combination for this reason in addition to the further limitations found in these claims. Reconsideration and withdraw of the rejections of claims 10-20 are therefore respectfully requested.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 18-1722.

Respectfully submitted,
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